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LETTER TO THE EDITOR

Discrepancy of ABO typing in acute leukemia patients

Dear Editor,

The ABO blood group is the most useful and important system in transfusion medicine. However, ABO blood group discrepancies have been noticed in normal blood donors and patients with malignancies, especially hematologic malignancies [1,2]. Here, we report two cases of acute myelogenous leukemia (AML) patients who showed a discrepancy in the ABO blood test using forward and reverse methods for the diagnosis.

Patient A, a 28-year-old male, was diagnosed with AML in April 2015. No blood group discrepancy was found with either A or B antigen in forward typing; however there was a 4+ agglutination with B cell without any agglutination with A cell in reverse typing (Table 1). The patient's history showed A+ blood type in blood donation. To investigate further, the fresh sample was tested by tube method with similar results. The auto-control, direct Coombs' and indirect Coombs' tests were performed with negative results. Further analysis by saliva test confirmed that the patient has A+ blood type. Cytogenetic study showed a normal karyotype without *FLT3*, *NPM1* mutation. He received induction chemotherapy with idarubicine and cytarabine, and complete remission was achieved. A recheck of the blood type for this patient was done in remission status and it was found that the discrepancy had disappeared.

Patient B was a 48-year-old man who was diagnosed with AML. Blood type was also performed with forward typing which showed an anti-A weak trace reaction and anti-B 4+ agglutination. There was no agglutination with A cell and B cell in reverse typing. The patient's blood type was reported as AB positive in the past. We ran the same protocol as patient A. The fresh sample was tested by tube method which resulted in 1+ reaction with anti-A after incubation at room temperature for 30 minutes. The auto-control, direct Coombs' and indirect Coombs' tests, were performed with negative results. We used a saliva test to confirm the AB+ blood group. The ABO discrepancy eventually disappeared after the patient achieved complete remission with chemotherapy.

Alteration of ABH antigens in hematologic malignancies was first reported in 1957 by van Loghem et al. [3] who described very weak A antigen expression on the red cells of a patient with acute myeloid leukemia, but had previously shown normal A antigen expression. Similar to our cases, the loss of A, B, or H antigens from the surface of red blood cells was reported and the discrepancy restored when the diseases were under control. Some reports showed that hematologic malignancies had the potential to alter the phenotype of ABH antigen expression due to genetic instability. One mechanism was the inactivation of H transferase encoded at 19q13 which would result in a decrease of H substance, which in turn would decrease A and/or B substance and cause a less frequent expression of these two antigens [4].

It was concluded that the discrepancy in these two cases were due to decreased expression of A antigens on the surface of red blood cells secondary to acute myeloid leukemia. The discrepancy was resolved after the disease was successfully treated. Further knowledge is warranted for a better understanding of these phenomena.

Table 1 Blood type tests before and after induction chemotherapy.

Therapy		Forward type				Reverse type		Saliva test
		Anti-A	Anti-B	Anti-A,B	Anti-D	A-cell	B-cell	
Patient A	Before	neg	neg	neg	4+	neg	4+	A H
	After	4+	neg	4+	4+	neg	4+	A H
Patient B	Before	±	4+	4+	4+	neg	neg	A B H
	After	4+	4+	4+	4+	neg	neg	A B H

neg = negative.

Conflicts of interest: All authors declare no conflicts of interest.

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